

# Office of Coast Survey



## 2006 Program Review



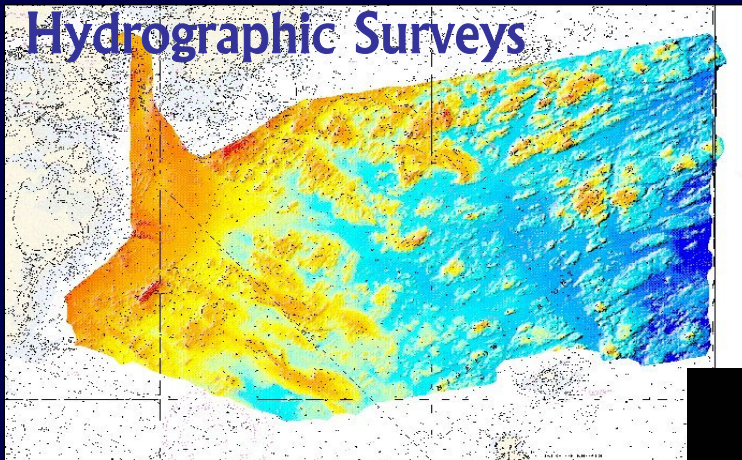
**Captain Roger L. Parsons, NOAA**

February 2006

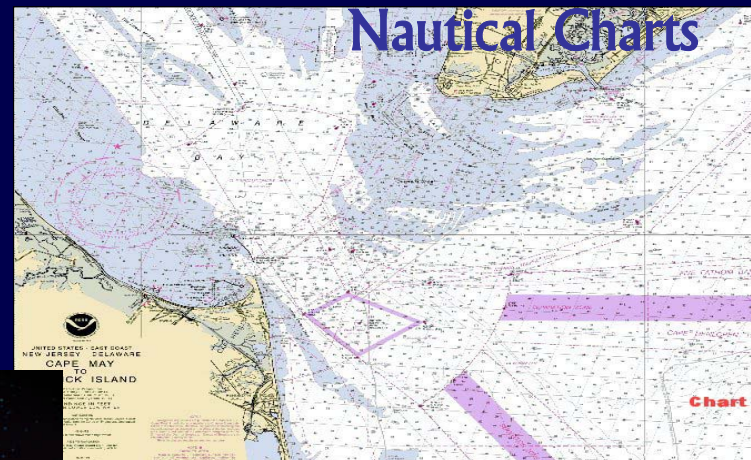
# NOAA SUPPORTS SAFE NAVIGATION...



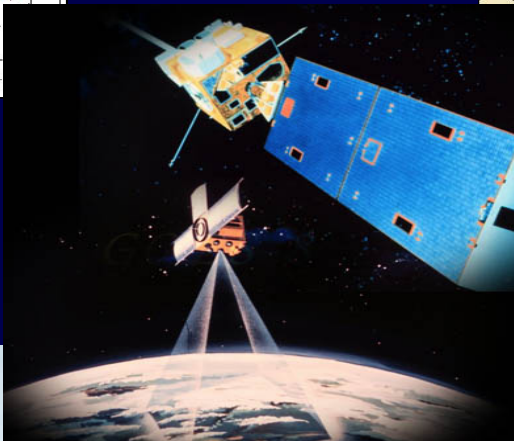
Hydrographic Surveys



Nautical Charts



National Spatial

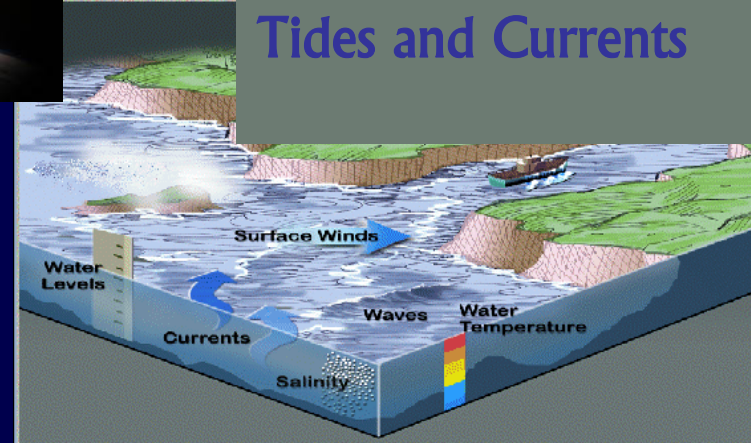


Reference System

Marine Forecasts

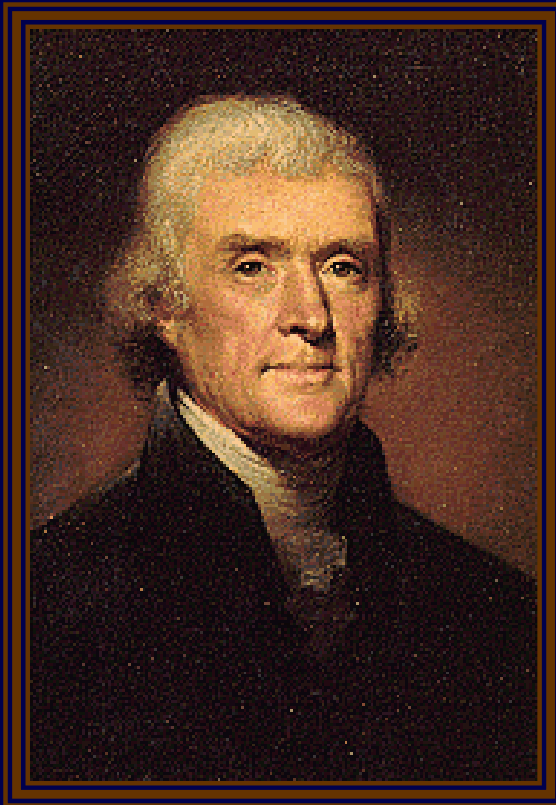


Tides and Currents





# Father of the Coast Survey



*"...to cause a survey to be taken of coasts of the United States, in which shall be designated the island and shoals and places of anchorage..."*

**President Thomas Jefferson, 1807**



- 2007 is the 200<sup>th</sup> Anniversary of the Survey of the Coast
- 1807 Survey incorporates today's OCS, NGS and CO-OPS
- Nation's economy continues to rely heavily on maritime commerce, navigation products and services



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# Coast Survey's Legislative Mandates



- **Coast and Geodetic Survey Act of 1947:** NOAA to provide nautical charts and products for safe maritime commerce and navigation.
- **The Hydrographic Service Improvement Acts of 1998/2002** reiterate this purpose and authorize increased funding for NOAA's navigation services.
- **Title 33 of the Code of Federal Regulations:** NOAA nautical charts, U.S. Coast Pilots, tidal and current information must be carried on all self-propelled vessels, including passenger vessels, greater than 1600 gross tons.

*Vision: Customers have accurate and timely information to navigate and manage U.S. coastal waters.*

*Mission: Acquire, integrate, and manage the Nation's marine information for nautical charting and coastal applications.*



# Legislative Issue



- Hydrographic Services Improvement Act Reauthorization in 2007 will require NOAA/NOS support for advancing draft legislation to/thru OMB



# United States Exclusive Economic Zone



NOAA's AREA of RESPONSIBILITY:  
3.4M SQ NAUTICAL MILES of U.S. EEZ

# The MARINE TRANSPORTATION SYSTEM

The Nation's network of oceans, lakes, rivers, canals, locks and dams

- 95,000 miles of U.S. coastline
- 25,000 miles of navigable channels
- 326 public/private ports
- 3700 marine terminals
- Supports 13M jobs, contributes \$742B+ annually to U.S. GDP
- 95% of U.S. foreign trade in/out by ship
- 110,000 commercial/recreational fishing vessels
- 78M recreational boaters

*Every U.S. citizen relies on the MTS: energy delivery, exports, transportation, cost-effective consumer goods, recreation, environmental protection*



U.S. Coast Guard  
February 2006



# THE RISING TIDE OF CHANGE

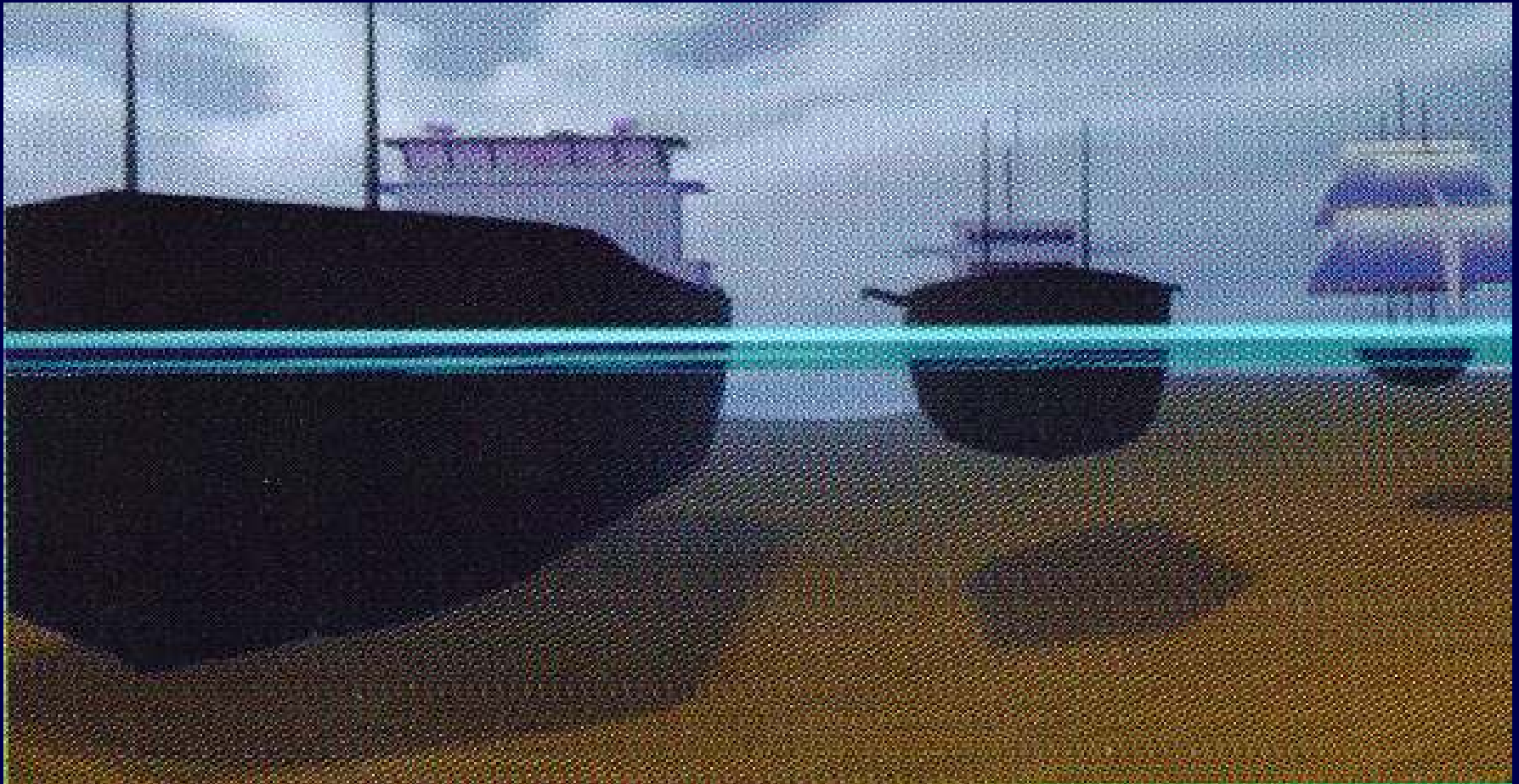


- U.S. global maritime trade projected to more than double between 1998 and 2020
- From 1999-2003, containership capacity calling at U.S. ports increased by 29%
- Over 2 billion metric tons of domestic and international waterborne cargo move on U.S. waterways each year
- Ferry boats now carry over 100M passengers annually
- The U.S. MTS hosts more than 5 million cruise ship passengers each year
- The U.S. imports 3.5 billion barrels of oil by ship every year to meet energy demands
- U.S. ports are our gateways for rapid military deployment, economic security – heavy Homeland Security focus on U.S. coastline borders





# Navigation in Perspective



***Ships are growing longer, wider and deeper***

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# Customers



## COMMERCIAL



## COMMERCIAL FISHING



## NON NAV USERS



## MILITARY



## RECREATIONAL



# Key Stakeholders



- Hydrographic Services Review Panel (HSRP)
- Port Authorities
- Pilots
- Management Association for Private Photogrammetric Surveyors (MAPPS)
- Navigation Safety Coalition



# The Hydrographic Services Review Panel

- Established by the Hydrographic Services Improvement Act Amendment of 2002
- Held First Public Meeting in April 2004
- 15 *voting members* qualified in:
  - hydrographic surveying;
  - tide, current, geodetic and geospatial measurement;
  - marine transportation;
  - port administration;
  - vessel pilotage; and
  - coastal and fishery management.
- Director, NOAA OCS, is Designated Federal Officer
- 3 *non-voting members*:
  - Co-Director, Joint Hydrographic Center, UNH
  - Director, NOAA CO-OPS
  - Director, NOAA NGS
- Advises the NOAA Administrator on NOAA's Navigation Services Programs



HYDROGRAPHIC SERVICES REVIEW PANEL





# U.S. Mapping and Charting Responsibilities



## U.S. Department of Commerce

- NOAA – Hydrography/National Shoreline surveys for legal boundaries, Tides and Currents, Nautical Charts for U.S. Territorial waters (to U.S. EEZ 200 nautical mile limit)



## U.S. Department of Defense

- Army Corps of Engineers – Dredging and maintenance of navigable channels and inland navigable waterways
- NAVOCEANO – Surveying international waters
- Nat'l Geospatial Intelligence Agency – Charting int'l waters for U.S. military, National Notice to Mariners



## U.S. Department of Homeland Security

- Coast Guard – Maintenance of maritime Aids to Navigation
- FEMA – Disaster Response and Floodplain Mapping



## U.S. Department of Interior

- U.S. Geological Survey – Interior to coastline base maps

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# INTERAGENCY COOPERATION



## NOAA/USGS

- Bathy/Topographic digital elevation models
- Board of Geographic Names

## NOAA/NAVY/COAST GUARD

- *Homeland Security Surveys*
- *Law of the Sea Surveys (UNCLOS)*
- *NRTs are Emergency Support Function in Nat'l Response Plan for maritime incidents/emergencies*

## NOAA/CORPS OF ENGINEERS

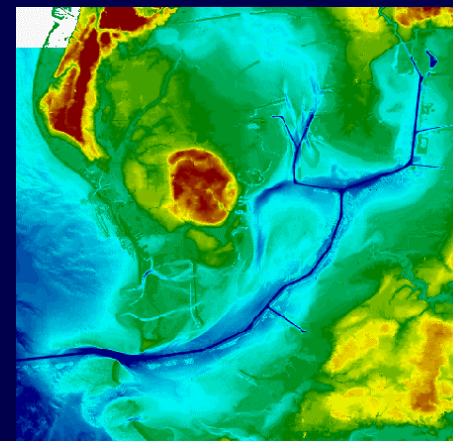
- Channel Survey data evaluation

## NOAA/COAST GUARD/CORPS OF ENGINEERS

- *Electronic Navigational Chart development*
- *Local Notice to Mariners*
- *Obstruction surveys for Coast Guard and COE*

## NOAA/STATE

- *Maritime Boundaries, official National Baseline determination*



# International Hydrographic Organization (IHO)



**Established in 1921, the IHO is an intergovernmental consultative and technical organization supporting international cooperation in the field of hydrography.**

- U.S. representation shared by NOAA and NGA, with input and consultation with US Navy and State Department
- Director, Office of Coast Survey, is the U.S. National Hydrographer



# Benefits of IHO to the U.S.



## Improved Safety of Navigation and Protection of the Marine Environment through:

- Sharing of data/information/products
- Regional Hydrographic Commissions
- Influence future leaders through Defense Security Cooperation Capacity Building
- Standards development for charting and hydrographic surveying
- Use of data for marine environmental protection
- Policy/technical influence through key positions
- Provides a common, uniform set of chart symbology easily recognized by mariners world-wide





# OCS Representation in the INTERNATIONAL HYDROGRAPHIC ORGANIZATION

## Directors:

VADM Alexandros Maratos, Greece – President

RADM Ken Barbor, United States – Director

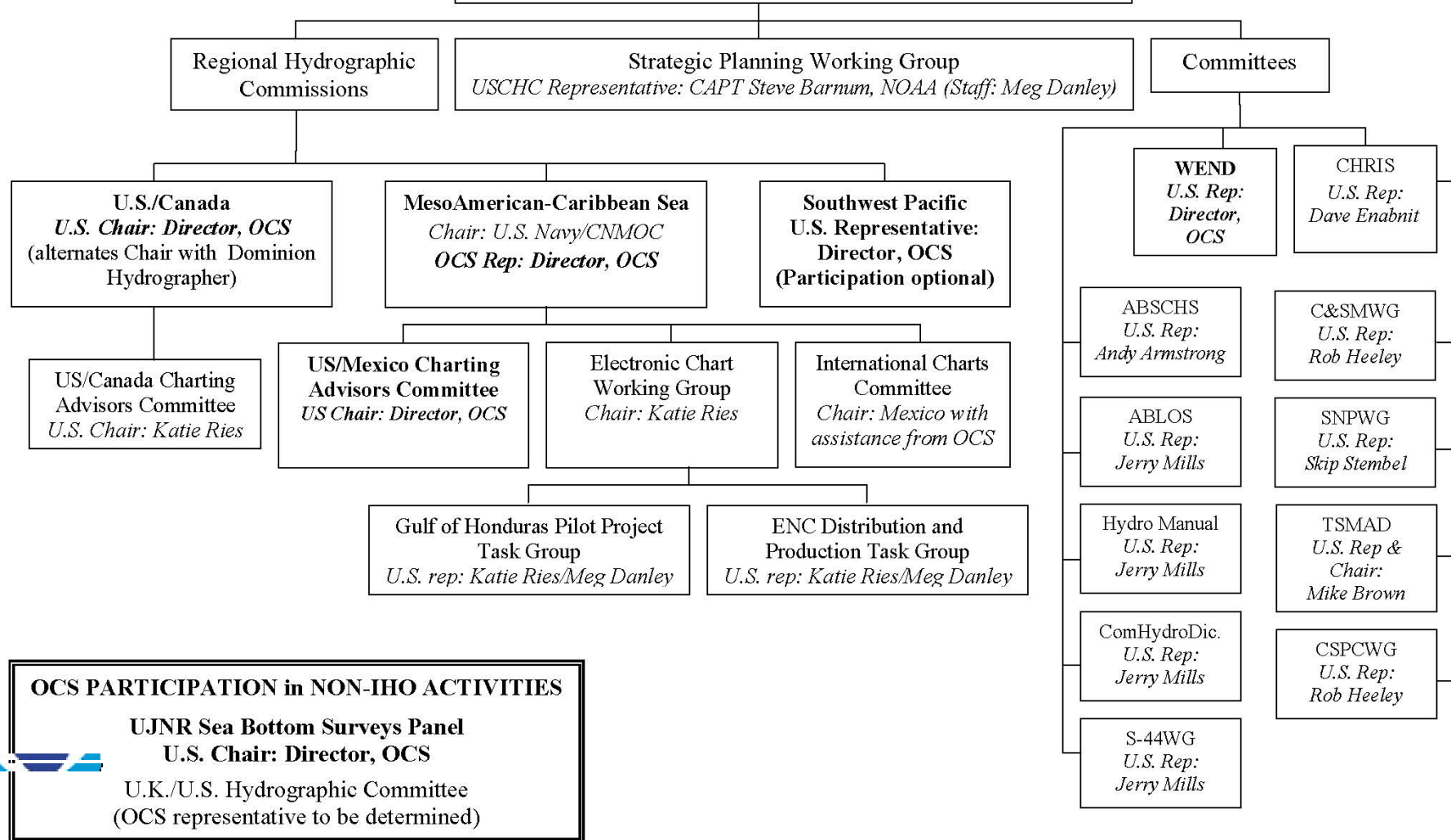
CAPT Hugo Gorziglia, Chile - Director

## U.S. Representatives:

*U.S. National Hydrographer, Director Coast Survey, NOAA*

*Chief Hydrographer, NGA*

*Hydrographer of the Navy, CNMOC U.S. Navy*



# Goal/Program Participation



- Commerce and Transportation
  - Steve Barnum, Goal Lead
  - 1 FTE staff support (2 add'l FTE as needed)
  - Marine Transportation System Program (2 FTE)
- Weather and Water
  - Environmental Modeling Program



# Goal/Program Participation



- Integrated Ocean and Coastal Mapping
  - IOCM Coordinator established in OCS to facilitate NOAA coordination efforts, lead NOAA IOCM effort
  - IOCM interagency coordination via JSOST (Ocean Action Plan)
  - Attention in FY08; FY09 is year of IOCM
  - Issue -- Get IOCM moving as a NOAA approach to business operations
    - Fleet Allocation/replacement
    - Prioritization strategy

## NOAA Programs in IOCM:

Habitat  
Corals  
Coastal & Marine Resources  
Protected Species  
Fisheries Management  
Aquaculture  
Ecosystem Observations  
Ecosystem Research  
Climate Observations & Analysis  
Climate & Ecosystems  
Coasts, Estuaries, and Oceans  
Environmental Modeling  
Tsunami  
Marine Transportation Systems  
Geodesy  
NOAA Emergency Response  
Homeland Security  
Fleet Services Sub-goal  
Satellite Sub-goal





# National Ocean Service



## Office of Coast Survey

301-713-2770

Director: Capt. Roger L. Parsons

Deputy Director: Kathryn Ries

NOAA IOCM Coordinator

Mike Gibson

## Program Planning & Management Staff

Chief: Curt Loy

### Marine Chart Division (MCD)

301-713-2724

Chief: Capt. Jim Gardner

Dep. Chief: Alexandra Heliotis

Raster/Paper Charts

Electronic Navigational  
Charts (ENC)

Critical Corrections  
Update Service

Nautical Data

Quality Assurance,  
Plans & Standards

### Hydrographic Surveys Division (HSD)

301-713-2698

Chief: Gerd Glang

Dep. Chief: CDR Carl Groeveneld

Operations

Atlantic  
Hydrographic  
Branch (AHB)

Pacific  
Hydrographic  
Branch (PHB)

### Navigation Services Division (NSD)

302-713-2729

Chief: Howard Danley

Dep. Chief: LCDR Rick Fletcher

Coast Pilot

Customer Affairs

Navigation  
Response

### Coast Survey Development Lab (CSDL)

301-713-2801

Chief: Mary Erikson

Deputy Chief: Maureen Kenny

Hydrographic  
Systems &  
Technology  
Programs

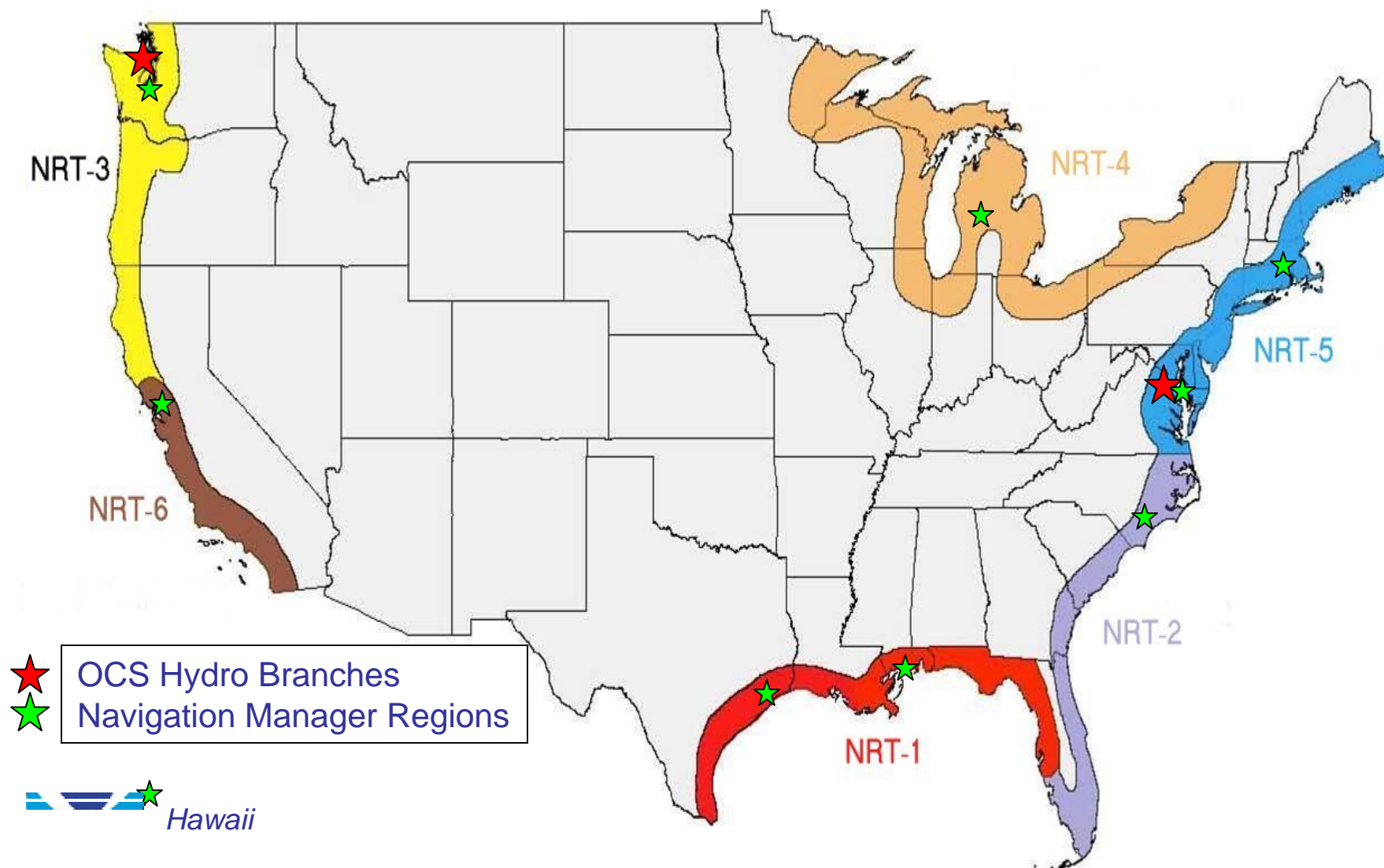
Cartographic &  
Geospatial  
Technology  
Programs

Marine Modeling &  
Analysis Programs



# OCS Field Operations/Representatives

★  
Alaska



# OCS Workforce Management



- 23% of Workforce Retirement Eligible in 2006
- 31% Retirement Eligible in 2009
- 44% of Senior Management Retirement Eligible in 2006 (GS-14s and above)
- 63% of Senior Management Eligible in 2009

**KEY ISSUE: SUCCESSION PLANNING**



# MAPPING & CHARTING BUDGET 2004 – 2008



	<u>Enacted</u>	<u>Actual OCS</u>
• 2004 – \$86.1M*		\$70.4M**
• 2005 – \$82.6M*		\$75.8M**
• 2006 – \$93.4M*		\$75.3M**
• 2007 Request – \$91.3M		
• 2008 Planned – \$89.8M		

\* After Congressional Rescissions

\*\* Post rescissions, overheads, NOAA Corp, Pass-Thrus (no carryover included)



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# 2006 OCS Funds (in \$000)



- OCS Funds - 81,357
- NOS Overhead Charge – (3,724)
- NOAA Corps Assessment – (1,381)
- OR&R Assessment – (275)
- Soft Earmarks – (43,613)
- Plus Allowable Carryover – 1,309
- Minus No ATB's – (741)
- OCS Base Operating Funds – \$32,932



2/3 of Final Base Operating Funds are Labor

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# OCS 2006 Earmarks and Directed Line Items (in \$000)



• Joint Hydrographic Center –	6,995
• Electronic Navigation Charts –	4,011
• Address Survey Backlog –	18,942
• Time Charter –	11,473
• EEZ Outer Continental Shelf –	1,487
• River Studies -	<u>705</u>
	\$43,613



Numbers reflect deductions for NOS Overhead & Assessments for  
NOAA Corps & ORR

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# 2006 Unfunded Increase Requests



- NRTs – \$682K
- Data Streamlining – \$1M
- VDatum – \$2M
- Socioeconomic Studies – \$300K
- ENCs – \$1.89M



# 2007 President's Request



- NRTs – \$1.8M
- Data Streamlining – \$1M
- VDatum – \$2M
- Socioeconomic Studies – \$300K
- ENCs – \$1.89M



# Program Impacts

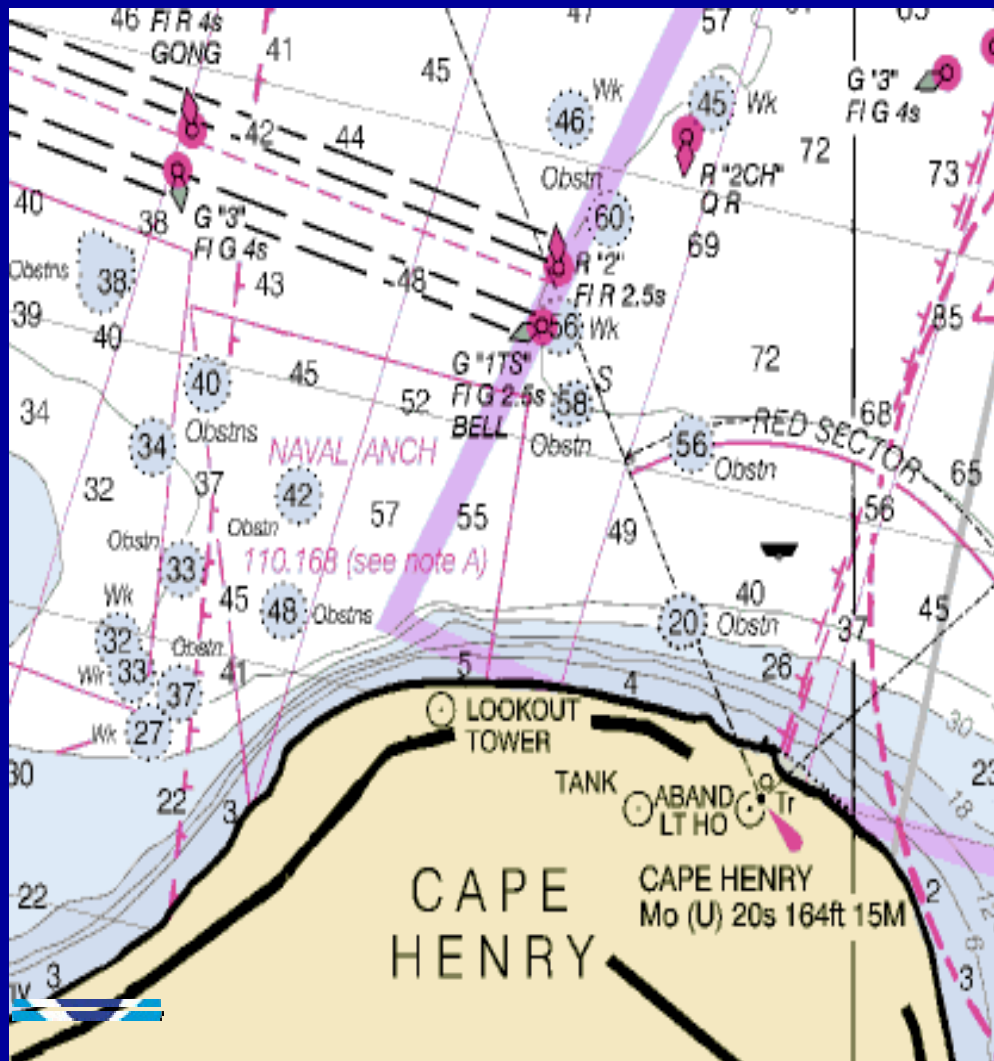


- NRT Expansion/Completion
- ENC Suite Completion
- V-Datum Expansion
- Ping-to-Chart Streamlining Effort





# NOAA Nautical Charts: The Mariner's Road Map



- Shoreline
- Depths, Depth Curves
- Obstructions
- Landmarks
- USACE Channel data
- Aids to Navigation
- Marine Boundaries
- Anchorages, Piers
- Marine Facilities and more!

- 1000 Paper/Raster Charts
- 250 editions in 2006
- Coast Pilot
- Weekly Updates
- Print on Demand
- Free Internet Download

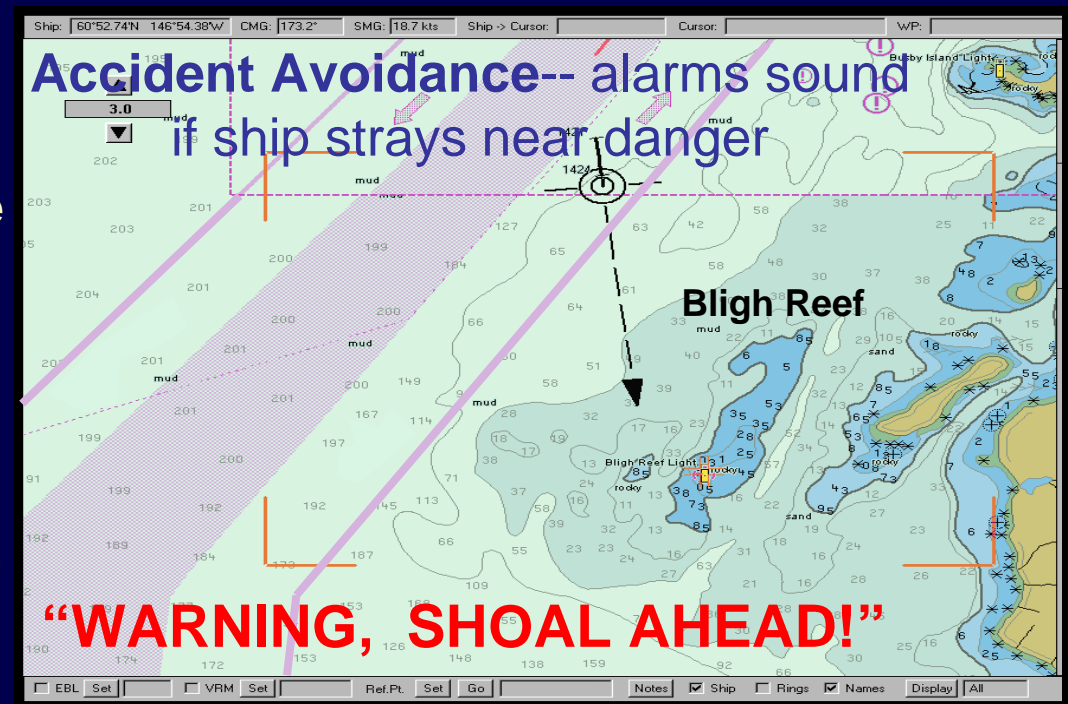
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# NOAA Nautical Charts: The NOAA ENC®



- Electronic Navigational Charts are databases of nautical chart info with enhanced flexibility
- ENCs work with U.S. Coast Guard Automatic Identification System, as a GIS for non-nav uses
- Available for free on the Internet since 2001 with critical correction updates (Downloads in millions)

- 40 ENCs planned for 2006, a significant drop in production due to budget realities (total 550)
- Goal is parity with 1000-paper chart suite for complete coverage of U.S. waters
- Coast Guard Electronic Chart Carriage requirements out in 2007



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# Major Deliverables



- Navigation Response Teams
  - 6 teams currently fielded out of base funds
  - NRT7 established via partnership with Defense to analyze sonar technologies for waterway security work
  - Funding for NRT7 ops and NRT8 in FY07 President's Request
  - Program needs infusion to base to support existing/new NRT equipment refresh, staff
- Navigation Managers
  - Regionally located liaisons with maritime community
- Coast Pilot
  - 8 editions to publish in FY06 (out of 9 books)
  - Available online, with critical correction updates





# NRT Hurricane Response



- NRTs were quickly dispatched to emergency sites
- NRTs mobilized from throughout the U.S.
- NRTs surveyed the Mississippi River, Port of Pascagoula, Port of Biloxi, Port of Mobile, Port of New Orleans, Port of Pensacola, Port of Gulfport, Port of Houston, Port of Galveston, Port Arthur, Lake Charles

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# Economic Impact on Gulf Ports



- **Unemployment**
- **Increase in Gasoline Prices**
- **Oil Industry Impacts**
  - 2,900 platforms in path of the hurricanes
  - 109 Oil platforms and 5 drilling rigs destroyed
  - 50 platforms and 19 drilling rigs suffered extensive damage
  - 90% of crude production stopped
  - 72 % of natural gas output stopped
- **Ocean Shipping**
  - 50% of America's exports of agricultural commodities like corn and soybeans



# Ports Critical to Gulf Relief Effort



- Cruise Ships used for housing emergency workers in New Orleans
- US Navy Hospital Ship in Pascagoula and Gulfport
- Ports essential to movement of food and relief supplies
- US Coast Guard security/law enforcement mission
- Vital imports of oil and coal













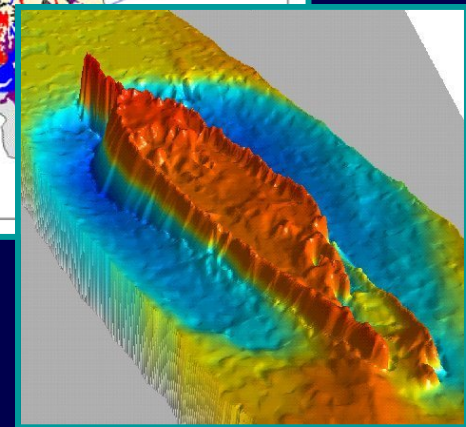
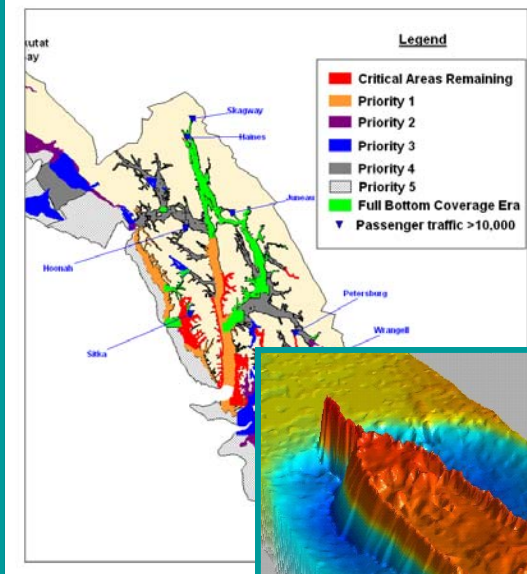
# Office of Coast Survey: Hydrographic Surveying



## NOAA Hydrographic Survey Priorities - Alaska

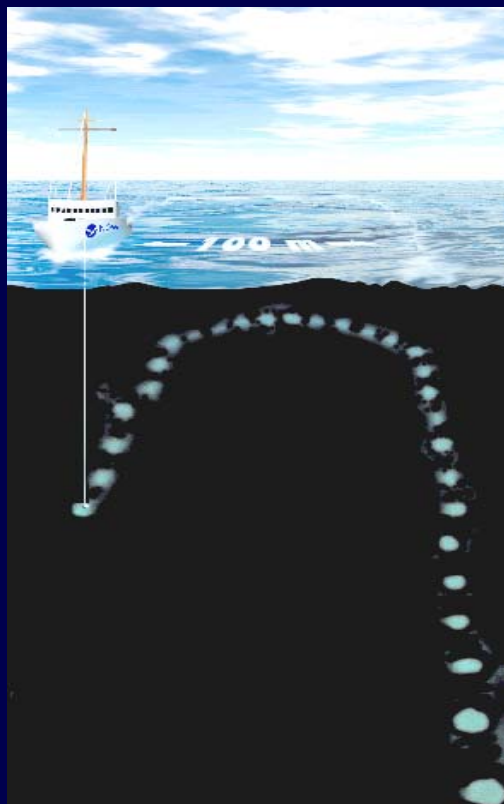
Southeast

March 2004

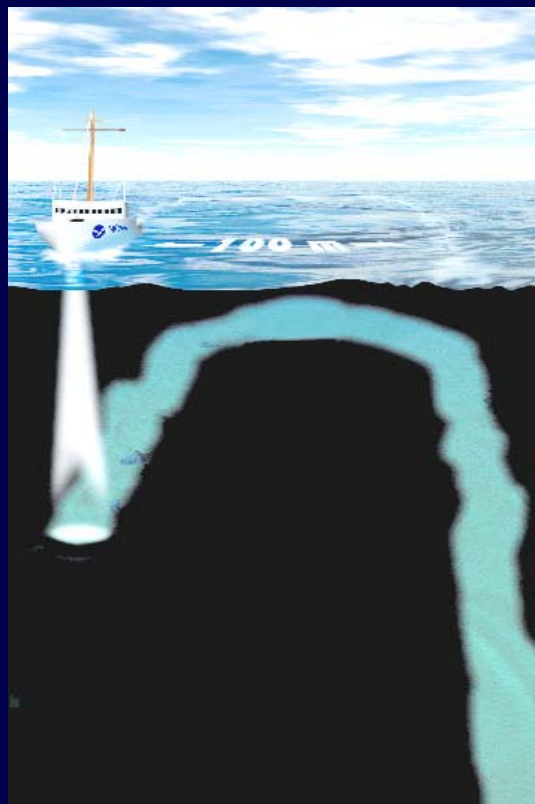


- *Integrated Ocean Observing System building block – basic parameter*
- *500,000 sq. nautical miles of EEZ are navigationally significant*
- *Rocks, wrecks, obstructions, depths and seafloor characteristics*
- *NOAA Hydro Survey Priorities at [nauticalcharts.noaa.gov/staff/NHSP.html](http://nauticalcharts.noaa.gov/staff/NHSP.html)*

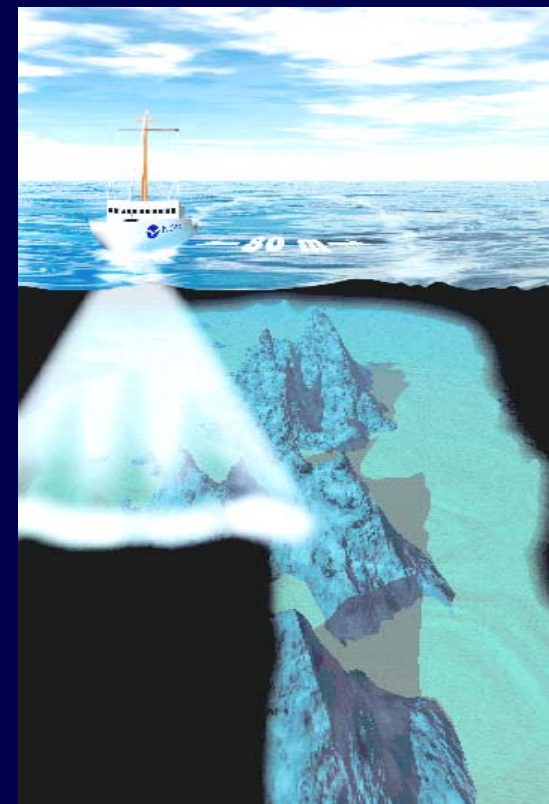
# Hydrographic Survey Methods Over Time: Bottom Coverage & Data Density



**Leadline**  
1-2000  
soundings  
per survey



**Single Beam**  
500 – 750K  
soundings  
per survey



**Multi Beam**  
4 – 100M  
soundings  
per survey



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# NOAA Hydrographic Fleet



**RAINIER**  
Seattle, WA  
1968

**BAY HYDROGRAPHER**  
Silver Spring, MD  
1988 (1996 to NOAA)



**FAIRWEATHER**  
Ketchikan, AK  
1968 (2004 refit)

**RUDE**  
Norfolk, VA  
1967



**THOMAS JEFFERSON**  
Norfolk, VA  
1992 (2003 to NOAA)



**SWATH Multipurpose  
Mapping Vessel**  
in FY07 (target)



*Collaborative relationship with NMAO*

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# Major Deliverables



- Hydrographic Surveys
  - FY2006 target is 2500 square nautical miles
  - GPRA measure
  - Reported in NOS AOP, monthly/quarterly quads
  - Weather/mechanical/contract delays can impact target
  - 100% requirement determined to be 10,000 SNM a year
- \$18.9M in Hydrographic Surveying Contracts to Outside Firms
- \$10.6M Vessel Time Charter Earmark



# SWATH Vessel



## *Small Waterplane Area Twin Hull*

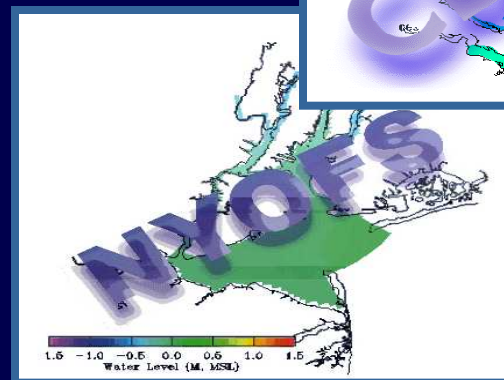
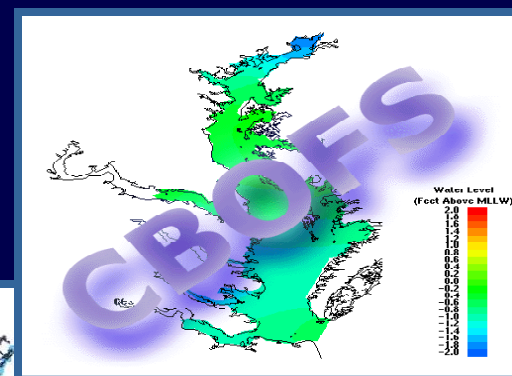
- Scheduled to replace RUDE
- Currently in Contract Design Phase
- Critical Design Review March 2006 – Build/No-Build
- Option for Detailed Design and Build to be exercised by May 2006
  - Deliver by Dec 2007
- \$27.3M Earmark Funding History:
  - 2002 \$5M
  - 2003 \$9M
  - 2004 \$0
  - 2005 \$9.3M
  - 2006 \$4M
- Actual after rescissions/NOAA cuts:
  - \$19M for SWATH





# Nowcast/Forecast Models

- Hydrodynamic models forecast water levels, currents conditions for hourly to 36-hour advance info
- Support for mariner safety/efficiency decisions:
  - How much cargo to load
- Trip routing for best water
  - Arrival/Departure Timing
- Operating models in Galveston, Chesapeake Bay, NY/NJ
- Tampa Bay, Delaware Bay, Great Lakes, Cook Inlet, Columbia River in development
- Critical IOOS Data Integrator



Operational Models available at [co-ops.nos.noaa.gov](http://co-ops.nos.noaa.gov)

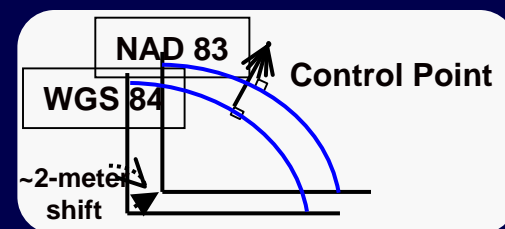
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# VDatum Transformation Tool



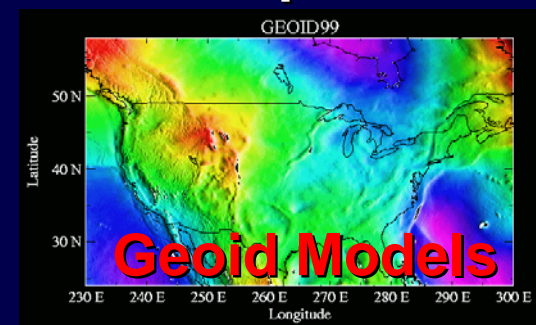
*Transforms bathymetric and/or topographic elevation data between any two of 28 tidal, orthometric, or ellipsoid vertical datums*

- OCS/NGS/CO-OPS joint effort
- Build seamless digital elevation models
- Perform kinematic hydrographic surveys
- Derive shoreline from LIDAR
- Enable more accurate storm surge and tsunami inundation modeling
- Enable integration of disparate datasets across programs, agencies, academia



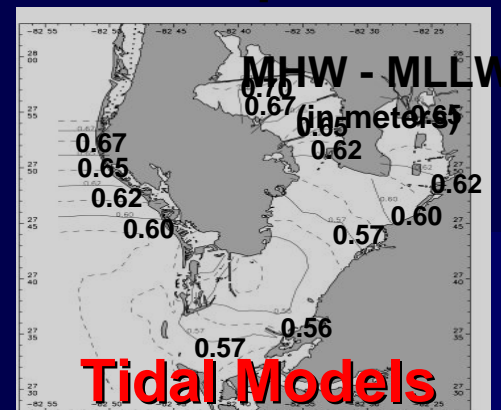
**Ellipsoidal Models**

+



**Geoid Models**

+



**Tidal Models**

# Major Deliverables



- Expansion of VDatum tool in FY06 includes
  - Northeast Gulf of Mexico (Mobile Bay to Cape San Blas)
- Hydrodynamic models under development and scheduled for completion in FY06
  - Lake Huron, Lake Ontario, Lake Superior
- In development:
  - Evaluation of AUV and Interferometric sonars to enhance survey capabilities
  - Collaborative NOAA project to evaluate real time storm surge models coupled to an ocean model



# NOAA Navigation Services: Research and Technology Development



- Working with private sector on Autonomous Underwater Vehicle (AUV) Technology
- AUVs offer significant potential for fleet multiplier effect – hydrography, fisheries research, undersea research

## Joint Hydrographic Center at UNH:

- learning center to promote education of new hydrographers and ocean mapping scientists
- research to develop and evaluate state-of-the-art ocean mapping technologies
  - Multibeam and sidescan sonar
  - Improved data processing techniques
  - Survey assessments for U.S. Law of the Sea claim to EEZ expansion on continental shelf



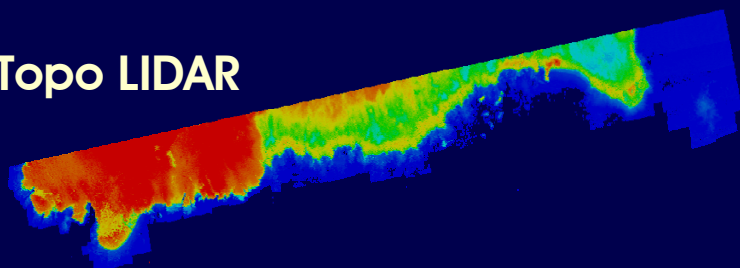
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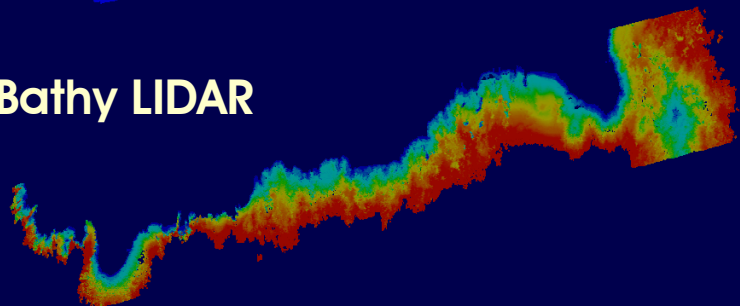
# NOAA Navigation Services: Research and Technology Development



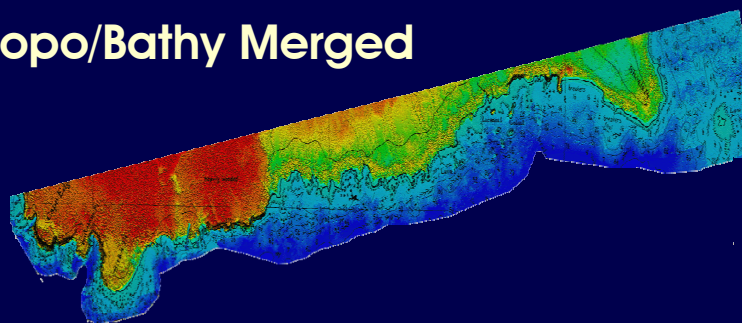
Topo LIDAR



Bathy LIDAR



Topo/Bathy Merged



- LIDAR Research: Light Detection and Ranging remote sensing systems
- LIDAR flown on aircraft offer potential for nearshore/shoreline surveying to:
  - gain efficiencies
  - maintain safety of survey operations
  - gather data in shallow nearshore areas that NOAA presently not surveying
- Topographic LIDAR images land
- Bathymetric LIDAR penetrates water under right conditions (clear, no turbidity)
- NOAA, USACE and Navy studying potential for improved object detection, merged topo/bathy LIDAR systems for shoreline/water line/nearshore data
- Requires VDatum tide models to unify reference levels, blend data sets

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